

Energy services at Hemel Hempstead General Hospital



- Energy services contract financed under the Private Finance Initiative
- Energy costs reduced by 12%
- Carbon dioxide emissions reduced by 33%



ENERGY EFFICIENCY

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BEST PRACTICE
PROGRAMME

OVERVIEW

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In 1990, a plan was developed to rationalise services between Hemel Hempstead and St Albans Hospitals. It was recommended that the Accident and Emergency (A&E) Department be primarily located at Hemel Hempstead. The result of this plan was that the A&E Department at Hemel Hempstead would treat 54 000 patients each year.

The boiler plant at the hospital was 35 years old and had an additional boiler added in 1986. The older boilers were inefficient and unable to cope with the additional demands resulting from the development of the A&E Department.

The Hospital decided to use an energy services contract (ESC) under the Private Finance Initiative (PFI) to finance the replacement of boilers and the redevelopment of the boiler house.

The improvements had to be carried out without any disruption to the steam and hot water supplies to the Hospital's buildings.

A £477 000 scheme was developed whereby Energy Services (UK) Ltd (ESUKL), the energy services company (ESCO) subsidiary of Midlands Electricity,

would provide two new boilers and operate and maintain the plant for ten years. ESUKL would also redevelop the boiler house under a separate £250 000 contract.

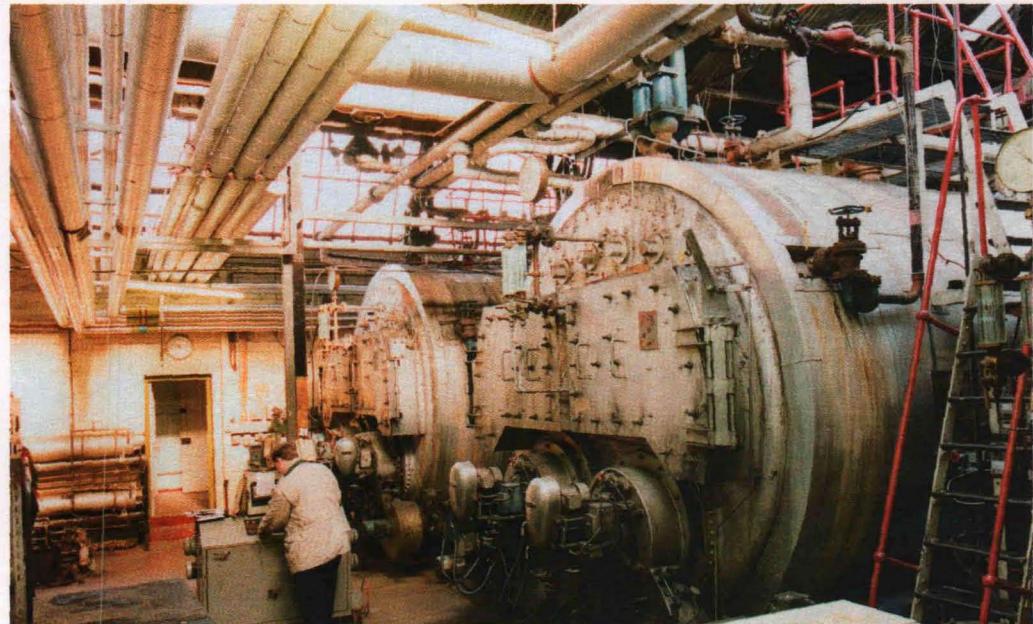
Under the scheme, the ESCO would sell the steam produced to the Hospital. The price structure was designed to give the ESCO an incentive to maximise the efficiency of steam production.

DEVELOPING THE BRIEF

As part of the design brief for the new boiler house, Capita Greatorex, a firm of consultants, considered a scheme to improve the provision of steam. They provided two alternatives – to replace the two old boilers or decentralise the steam production at the site.

The decentralisation option was rejected because there was insufficient space on site, and the replacement of boilers accepted.

European Union rules for public sector procurement require that, where the total payments are over a certain threshold, service contracts have to be advertised in the Official Journal of the European Community (OJEC).



Boiler plant at the Hospital before refurbishment

PUBLIC SECTOR COMPARATOR

The Hemel Hempstead project was advertised in the OJEC in 1995 and nine expressions of interest were received. Five companies were shortlisted on the basis of their financial strength, track record and the quality of their submissions. One withdrew and the four remaining firms were invited to tender for the project as a capital purchase or as an ESC.

Two companies returned tenders. These proposals were thoroughly assessed at a formal interview with the Vice Chairman of the Hospital Trust, the Director of Finance, the Head of Planning and the M&E consultants.

Both tenderers had considered combined heat and power (CHP) schemes as part of their proposal development, however the heat load was insufficient to make the provision of steam using CHP viable. A central steam boiler plant was, therefore, the appropriate solution.

ESUKL was selected as the preferred partner for the project.

PUBLIC SECTOR COMPARATOR

The proposed ESCO scheme was compared to the option of using treasury funds to carry out the work.

ESUKL quoted for each option and the cash flows were compared.

The value of the risks that were transferred was assessed. These risks are detailed on the next page.

The net present value of the costs of the ESCO scheme was less than 90% of the net present value of the capital purchase option.

CHOICE OF ENERGY SERVICES ROUTE

An ESC was considered to be the best route for the scheme as it had a number of benefits.

- Government policy states that hospitals should contract out non-core activities.
- It reduced the demands on management and transferred risk to the ESCO.
- It provided better value for money than the option of purchasing the plant. The cost was less than 90% of the capital purchase equivalent.
- It did not use the Hospital's existing capital funding.

The ESC covers the provision of steam to the Hospital. The obligations of the ESCO are expressed in terms of the service provided rather than specific tasks. This allows the ESCO freedom to identify the most efficient way to provide the service. The key elements of the output specification are shown in the box on the left.

TRANSFER OF RISK

The transfer of risk to the private sector partner is an important aspect of contracting of energy services. The basic principle that was used at Hemel Hempstead was that each party should bear the risks which they were best placed to manage.

During the contract negotiation process, both parties were aware that the transfer of risks increases the price of the contract. The Hospital selected the risks that were to be transferred to the ESCO such that they optimised the value for money to the Hospital.

KEY ELEMENTS OF THE OUTPUT SPECIFICATION

- A continuous supply of steam will be supplied at a pressure of 5.4 bar up to a maximum flow rate of 7700 kg/hour, providing that demand for steam does not vary by more than 15% from its level at the time the contract was signed.
- Steam shall be delivered at not less than 0.85 dryness fraction for not less than 80% of the time. The steam will have no contaminants.
- As the Hospital is responsible for the steam distribution network, there is an obligation to ensure that the returned condensate will be free from contamination and that the mass flow shall not be less than 90% of delivered steam.

END OF THE CONTRACT

END OF THE CONTRACT

At the end of the 10-year contract, the ESCO has the option to sell the equipment to the Hospital for £100 or to remove it at its own cost when the Hospital has an alternative heating system available. In practice, it is extremely unlikely that the ESCO would want to remove the equipment, or that the Trust would wish to replace it.

THE NEGOTIATING PROCESS

The negotiations for the ESC were very time consuming, and took two years to conclude. The Hospital estimates that 50 person days of staff time were required. In addition, legal advisors were retained, and their costs amounted to between £30 000 and £50 000. Financial advice was provided in-house by Trust staff.

The issues that took up most of the negotiators' time were:

- quantifying value for money
- determining which risks would be transferred to the ESCO
- establishing that the project met the PFI rules
- agreeing the accounting treatment of the scheme
- the provisions for what happened to the plant at the end of the contract.

BENEFITS TO HEMEL HEMPSTEAD GENERAL HOSPITAL

The Hospital needed to upgrade the boiler plant to enable the expansion of the A&E Department. By using the ESCO solution, they have:

- obtained the best value for money
- transferred responsibility for the management of the plant

- transferred the risks of equipment failure and maintenance
- saved £13 000 a year, the cost of one employee who was re-deployed within the hospital
- saved £2500 a year, the cost of emergency call-out charges following loss of steam
- reduced energy costs and carbon emissions.

LESSONS LEARNED

The Trust believes that having gone through the energy services process once it will find future contracts easier to negotiate and is happy to make its expertise available to other hospitals in the region.

ENERGY EFFICIENCY BEST PRACTICE PROGRAMME DOCUMENTS

The following publications are available from the BRECSU Enquiries Bureau. Contact details are given below.

Energy Consumption Guide

72 Energy consumption in hospitals

Good Practice Case Study

385 Energy services at Warwickshire schools

Good Practice Guides

- 261 Reducing energy waste in the NHS – a good housekeeping guide for managers
- 267 Combined heat and power in hospitals
- 289 A guide to contract energy services in the public sector (in preparation by BRECSU)

USEFUL ADDRESSES

Combined Heat and Power Association
Tel 020 7828 4077
Fax 020 7828 0310
Website www.chpa.co.uk

Energy Systems Trade Association
Website www.estra.org

Private Finance Initiative
Website www.hm-treasury.gov.uk/pub/html/finance95/main.html

Treasury Taskforce
Tel 020 7211 1340 (policy)
020 7270 4842 (projects)
Fax 020 7211 1346 (policy)
020 7270 5760 (projects)
Website www.treasury-projects-taskforce.gov.uk

This Case Study is based on material drafted by Databuild under contract to BRECSU for the Energy Efficiency Best Practice programme.

The Government's Energy Efficiency Best Practice programme provides impartial, authoritative information on energy efficiency techniques and technologies in industry and buildings. This information is disseminated through publications, videos and software, together with seminars, workshops and other events. Publications within the Best Practice programme are shown opposite.

For further information on:

Buildings-related projects contact:
Enquiries Bureau

BRECSU

Building Research Establishment
Garston, Watford, WD2 7JR

Tel 01923 664258

Fax 01923 664787

E-mail brecsu@bre.co.uk

Internet [BRECSU](http://www.bre.co.uk/brecsu/) – <http://www.bre.co.uk/brecsu/>

Internet [ETSU](http://www.etsu.com/eebpp/home.htm) – <http://www.etsu.com/eebpp/home.htm>

Industrial projects contact:
Energy Efficiency Enquiries Bureau

ETSU

Harwell, Oxfordshire
OX11 0RA

Tel 01235 436747

Fax 01235 433066

E-mail etsueng@aeat.co.uk

Energy Consumption Guides: compare energy use in specific processes, operations, plant and building types.

Good Practice: promotes proven energy efficient techniques through Guides and Case Studies.

New Practice: monitors first commercial applications of new energy efficiency measures.

Future Practice: reports on joint R&D ventures into new energy efficiency measures.

General Information: describes concepts and approaches yet to be fully established as good practice.

Fuel Efficiency Booklets: give detailed information on specific technologies and techniques.

Introduction to Energy Efficiency: helps new energy managers understand the use and costs of heating, lighting etc.

ENERGY EFFICIENCY

The risks transferred to ESUKL were:

- construction cost overrun – through the use of a fixed price contract, ESUKL was responsible for the cost of any overrun
- construction programme overrun – if the work had not been completed on time the contract would have been terminated and all equipment would belong to the Trust
- design risks – if what was proposed did not operate as efficiently as expected, ESUKL would bear any additional costs
- the risks associated with loss of service have been transferred to ESUKL who pays penalties to the Trust if the service fails for more than two hours
- plant repairs and maintenance will now be the responsibility of ESUKL – this gives an incentive to perform well, as ESUKL would suffer the costs of increased energy consumption or loss of service
- legislation – the risks of any changes in environmental legislation would be born by ESUKL
- insurance – ESUKL will be responsible for all insurance associated with the boiler house activity.

The risk of a fall in demand is borne by the Trust through the payment of a standing charge which covers all fixed costs.

It was essential that the supply of steam and hot water to the Hospital would not be disrupted during the works. ESUKL gave a guarantee that there would be a specified output of steam throughout the process.



A guarantee was endorsed by ESUKL's parent company, Midlands Electricity plc. This ensured that if the ESCO (ESUKL) failed to meet any of its obligations, these obligations would be met by Midlands Electricity.

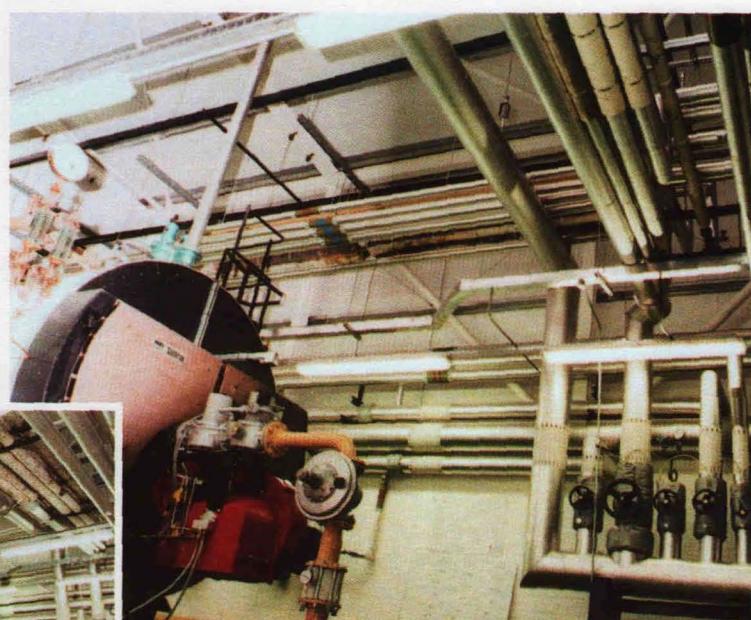
ENERGY EFFICIENCY

The pricing structure of the contract gives the ESCO a significant incentive to generate steam efficiently. All the fixed costs associated with the contract are recovered from the sale of the first 100 lbs of steam and the price for remaining sales are at the marginal cost of gas and water treatment. Thus, it is crucial to the ESCO to maintain operating efficiency, or it will lose money. Thus ESUKL derives no benefit from any increase in the Hospital's demand for energy.

The new boiler plant provides 25% more steam than the old plant to serve the increased demand for the expanded A&E unit. Despite the increased heat demand, total energy costs remained the same at approximately £80 000 per year.

- Energy cost per square metre fell by 12%.
- Carbon emissions per square metre fell by 33%.

New boilers installed in the new boiler house



ARCHIVED DOCUMENT

HOST ORGANISATION



Mr Burns, Business Manager, ESUKL (left), and Michael Clarke

'A reliable supply of steam is critical to our operations. We needed to replace the worn out boilers and increase capacity without any risk of loss of service.'

'The energy services scheme has improved the reliability of steam production, reduced our potential spending on this service by £42 000 a year and helped us to meet our objectives to reduce energy consumption and CO₂ emissions.'

MICHAEL CLARKE
Head of Planning
Hemel Hempstead General Hospital